Claims

What is claimed is:

1. A method of propagating data, comprising:

mirroring the data from a first filer to a second filer; and

mirroring the data from the second filer to a third filer;

wherein snapshots are used in mirroring the data.

2. A method as in claim 1, wherein the data is organized in one or more volumes on the filers, and wherein one or more of the volumes are mirrored.

3. A method as in claim 2, wherein the first filer uses softlocks to mark snapshots needed for mirroring volumes from from the first filer.

4. A method as in claim 3, wherein deletion of a snapshot marked with a softlock is prevented.

5. A method as in claim 4, wherein entry of a release command to the first filer informs the first filer that the second filer will no longer mirror the volume from the first filer, and wherein the softlocks are updated to indicate that any snapshot corresponding to the volume can be deleted.

6. A method as in claim 2, wherein the second filer uses softlocks to mark snapshots needed for mirroring volumes from from the second filer, and wherein deletion of a snapshot marked with a softlock is prevented.

7. A method as in claim 2, wherein each filer uses softlocks to mark snapshots needed for mirroring volumes to any downstream filers, and wherein deletion of a snapshot marked with a softlock is prevented.

8. A method as in claim 7, wherein entry of a release command to the second filer informs the second filer that the third filer will no longer mirror the volume from the second filer, and wherein the softlocks are updated to indicate that any snapshot corresponding to the volume can be deleted.

9. A method as in claim 2, further comprising use of jump ahead protection during mirroring operations.

10. A method as in claim 9, wherein the jump ahead protection comprises preventing activation of a snapshot of a volume while mirroring the volume to another filer.

11. A method as in claim 2, wherein the second filer also mirrors one or more volumes from a fourth filer.

12. A method as in claim 2, wherein a fourth filer also mirrors one or more volumes from the second filer.

13. A method as in claim 2, wherein the second filer also mirrors one or more volumes from a fourth filer, and wherein a fifth filer mirrors one or more volumes from the second filer.

14. A memory storing information including instructions, the instructions for propagating data, the instructions comprising:

mirroring the data from a first filer to a second filer for mirroring to a third filer;

wherein snapshots are used in mirroring the data.

15. A memory as in claim 14, wherein the data is organized in one or more volumes on the filers, and wherein one or more of the volumes are mirrored.

16. A memory as in claim 15, wherein the information further includes softlocks that mark snapshots needed for mirroring volumes from from the first filer.

17. A memory as in claim 16, wherein the instructions further comprise preventing deletion of a snapshot marked with a softlock.

18. A memory as in claim 17, wherein the instructions further comprise, upon entry of a release command to the first filer that informs the first filer that the second filer will no longer mirror the volume from the first filer, updating the softlocks to indicate that snapshots corresponding to the volume can be deleted.

19. A memory as in claim 15, wherein the information further includes softlocks that mark snapshots needed for mirroring volumes from from the second filer, and wherein the instructions further comprise preventing deletion of a snapshot marked with a softlock.

20. A memory as in claim 15, wherein the information further includes softlocks that mark snapshots needed for mirroring volumes to any downstream filers, and wherein the instructions further comprise preventing deletion of a snapshot marked with a softlock.

21. A memory as in claim 15, wherein the instructions further comprise instructions for jump ahead protection during mirroring operations.

22. A memory as in claim 21, wherein the instructions for jump ahead protection further comprise preventing activation of a snapshot of a volume while mirroring the volume to another filer.

23. A memory as in claim 15, wherein the second filer also mirrors one or more volumes from a fourth filer.

24. A memory as in claim 15, wherein the memory includes RAM, ROM, a disk, or a CD-ROM.

25. A filer that mirrors data to one or more other filers, comprising:

a file system that stores the data;

a processor; and

a memory storing instructions for the processor, the instructions comprising: mirroring the data from the filer to a second filer for mirroring to a third filer, wherein snapshots are used in mirroring the data.

26. A filer as in claim 25, wherein the data is organized in one or more volumes on the file system, and wherein one or more of the volumes are mirrored.

27. A filer as in claim 26, wherein the file system further stores softlocks that mark snapshots needed for mirroring volumes from from the filer.

28. A filer as in claim 27, wherein the instructions further comprise preventing deletion of a snapshot marked with a softlock.

29. A filer as in claim 28, wherein the instructions further comprise, upon entry of a release command to the filer that informs the filer that the second filer will no longer mirror the volume from the filer, updating the softlocks to indicate that snapshots corresponding to the volume can be deleted.

30. A filer as in claim 26, wherein the file system further stores softlocks that mark snapshots needed for mirroring volumes to any downstream filers, and wherein the instructions further comprise preventing deletion of a snapshot marked with a softlock.

31. A filer as in claim 26, wherein the instructions further comprise instructions for jump ahead protection during mirroring operations.

32. A filer as in claim 31, wherein the instructions for jump ahead protection further comprise preventing activation of a snapshot of a volume while mirroring the volume to another filer.

33. A filer as in claim 26, wherein the second filer also mirrors one or more volumes from a fourth filer.

34. A filer as in claim 26, wherein the file system utilizes a write anywhere file system layout implemented on a redundant array of inexpensive disks.

35. Data stored in a memory of a filer, the filer mirroring one or more volumes to a second filer for mirroring to a third filer, the data comprising one or more softlocks that indicate what volumes are mirrored to the second filer and the third filer, whereby deletion of snapshots associated with those volumes is prevented.